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keep their labor, and a period of waning prosperity followed. The emancipation of the peasants in 1864 and the introduction of modern tools and methods since then have given agriculture a great impetus. Again, at the beginning of the nineteenth century, when the Czar wished to manufacture Russian raw materials within Russian territory and invited German weavers and other artisans to come to Lodz to establish factories, Germans came in great numbers and inaugurated the era of industrial prosperity that distinguished that corner of the Czar's dominions. Lodz, which had less than 1,000 people in 1820, has now 500,000, though it has no single feature other than the Czar's whim to make it a suitable site for an industrial city. These two services of the Germans, the introduction of agriculture and of industry, have never been properly appreciated in Germany!

The Poles are said to be bright, cheerful, excitable but not liable to become ugly under excitement, and very patriotic. At work, however, they are clumsy and lack persistence. Polish manufacturing processes and products were unnecessarily costly but enjoyed a vast market in Russia that would be lost in the event of Polish independence; yet it was thought that under better management economies would make it possible to market products within the country.

A peculiar feature of the agriculture of the land is that more than half of it is occupied in small farms by families so large that they consume their whole product. Although two-thirds of the people are agriculturists, the country had to import grain from Russia. The war, by cutting this off and causing inevitable devastation, brought distress! Briefly, but in quite another tone, we read of the "unutterable sufferings" the war brought to the Germans in the country.

The forests have been badly handled, wood being exported in times of scarcity. The best industrial region is south of Lodz, near the coal mines. The mines produced 7,000,000 tons yearly as compared with 44,000,000 tons in Upper Silesia. The capital employed in industry was mostly foreign, mostly German one gathers, though the amount is withheld in a statement that assigns 60,000,000-70,000,000 rubles to France, 15,000,000-20,000,000 to Russia, and 5,000,000 to England.

Next in number to the Poles are the Jews, speaking Yiddish, which is really a modified German, though more of them came from the East than from the West. These 2,000,000 Jews are of low culture, filthy in their habits, and form a majority of the inhabitants of the cities, except Lodz and Warsaw. Russian law forbade them to live in the same villages with Russian farmers. Some of them are factory hands or travel as itinerant tailors, cobblers, or carpenters—a great deal of handwork being customary—but mostly they are peddlers, traders, shopkeepers, or bankers. It was characteristic that in Warsaw handmade shoes were cheaper than the local factory product.

In short, Congress Poland is a transition state between Germany and Russia. Germans, though resisted by Russia, had given it what share of modern culture it possessed. These Germans, intelligent factory hands and farmers, constituted 5 per cent of the population. 75 per cent were Poles, ignorant, inefficient, and amiable; 15 per cent Jews, dirty and ignorant; and 5 per cent Russians and Lithuanians.

MARK JEFFERSON

MINERAL RESOURCES OF SOUTH AMERICA

B. L. MILLER AND J. T. SINGEWALD, JR. **The Mineral Deposits of South America.** ix and 598 pp.; maps, diagrs., ills., bibliogr., index. McGraw-Hill Book Co., Inc., New York, 1919. $5.00. 9½ x 6 inches.

A thoroughly praiseworthy piece of work has been done by these two authors, who have not merely compiled a list of mineral localities with some comment on the petrography of South America but have also conceived their problem in a broad way and have written informatively. The material is arranged in alphabetical order by countries. There is an introductory section on the physiographic divisions of South America, and the description of each division includes a brief statement of the topographic features, the rocks, and the mineral deposits of economic importance. The discussion is necessarily brief and, from the geographical standpoint, less interesting and valuable than the geographic sections under the several chapters that deal with the countries of South America.

While the absence of geographic features in a book on mineral topics does not constitute a fair basis of criticism, one cannot help remarking that the topographic features are described quite empirically, with no mention at all of physiographic history and no generalization regarding topographic form. The descriptions of the Andes run like the descriptions of the older textbooks, according to mountain chains, mountain heights, passes, etc. The result is that one obtains no adequate picture of the topography of South America as a whole or of the several countries. It would have required no more space to have described the features in terms to permit generalizations to be made. Certainly if any description at all is given it should be in the form that even a geologist would find useful. Nevertheless it must be said that no similar work has been published and that the material is put in such convenient form that a valuable service has been rendered by the authors in publishing their book.

EUROPEAN TORNADOES

ALFRED WEGENER. **Wind- und Wasserhosen in Europa.** xi and 301 pp.; maps, diagrs., ills., bibliogr. (Series: Die Wissenschaft: Sammlung von Einzeldarstellungen aus den Gebieten der Naturwissenschaft und der Technik, Vol. 60.) Friedr. Vieweg & Son, Brunswick, 1917. M. 12. 9 x 6 inches.

Because of the extraordinary intensity and great frequency of tornadoes in the United States, American meteorologists have rather naturally paid very little attention to these phenomena in other countries, as they there occur in milder form and relatively rarely. Thus in one of the standard American textbooks on meteorology we find only the following statement regarding tornadoes outside of the United States: "They are known in less frequent occurrence in Europe and other parts of the world," and in another recent textbook we read "the tornado . . . is peculiar to the United States, although in a slightly modified form it at times occurs in other parts of the world." Even in Hann's monumental and extraordinarily comprehensive "Lehrbuch der Meteorologie" (3d edition), of the 12½ pages devoted to whirlwinds, tornadoes, and waterspouts, 8½ concern the tornadoes of the United States and the remaining 4 deal with these phenomena in other countries. It is, indeed, almost certain that very few of our professional meteorologists have any clear ideas concerning what we call "tornadoes" in other parts of the world.

For this reason we welcome Dr. Wegener's new and very careful study of the whirlwinds (*Windhosen, Tromben*) and waterspouts of Europe. The author has collected, from a wide range of literature, the available observations and descriptions of these phenomena; he has classified and summarized these accounts from the standpoint of their physical explanation; and he has given a clear and withal an interesting discussion of the various characteristics of whirlwinds and of waterspouts. It is nearly fifty years (Reye, 1872) since any attempt has been made to collect and summarize the facts concerning European whirlwinds. Dr. Wegener has expressly limited his study to Europe, as he says in his preface and as his title indicates, but there are frequent comparisons with the phenomena of American tornadoes. The author confesses that he has not been able to collect all the existing accounts of European whirlwinds, partly because of the exigencies of the war. The preface is dated "In the Field," August, 1916.

The portions of this monograph which naturally attract the attention of an American reviewer are those which emphasize the striking differences existing between the mild, infrequent, and relatively safe whirls of Europe and the violent, frequent, and destructive American tornadoes. Thus (p. 85) four years, 1883-1886, brought, according to Finley, 777 tornadoes in the United States, while the four years with the most tornadoes in Europe, viz. 1884-1887, gave only 35. European thunderstorms bring most tornadoes in autumn and early winter and in the morning hours, while in the United States the maximum number of tornadoes comes in spring and early summer, and in the afternoon. Of 89 weather maps on days with tornadoes in Europe, only 49 showed marked barometric depressions. In relation to the particular octant of the depression in which these disturbances are most frequent, Dr. Wegener's figures show this to be east-southeast. The prevailing direction of progression is from southwest and west, as here. The average velocity is about 14½ miles an hour, which is only about one-third of that in the United States. More than one-half of the paths which can be clearly determined for Europe give an average length of between 0.6 mile and 6 miles (1-10 kilometers). The duration of 61 per cent of the tornadoes which have been studied was between 5 and 30 minutes. But the most striking fact about European tornadoes is their very slight destructiveness. Thus loss of life is reported in only 5 per cent of the cases cited; and a liberal allowance for loss of life, which it is impossible to determine with accuracy, gives an average of 0.4 for the number of deaths per tornado. It is surely unnecessary to give any comparative statistics for the United States. Of 25 cases in which the direction of rotation was noted, 18 showed cyclonic and 7 showed anti-cyclonic rotation.

Dr. Wegener has brought together (pp. 275-279) several personal accounts of the direct contact of ships at sea with waterspouts. This particular relation of waterspouts has been much discussed, and there are many exaggerated views in regard to it. A reading of these narratives leads to the irresistible conclusion that waterspouts relatively rarely do serious damage to vessels which come in contact with them.